

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

ACTON et al

Atty. Ref.: 608-326

Serial No. Unassigned

Group:

Filed: December 14, 2001

Examiner:

For: REDUCTION IN MINERAL SALT DEPOSITION

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December 14, 2001

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

PRELIMINARY AMENDMENT

Please amend the above application as follows:

IN THE CLAIMS

Please substitute the following amended claims for corresponding claims previously presented. A copy of the amended claims showing current revisions is attached.

3. (Amended) A composition as claimed in claim 1 wherein the seed crystals are of Mean particle size of 0.5 to 2 microns.

4. (Amended) A composition as claimed in claim 1 wherein the seed crystals are present in the dispersion in an amount of from 1 to 60% by weight based on the total weight of dispersion.

5. (Amended) A composition as claimed in claim 2 wherein the seed crystals are barium sulphate crystals and have 3 dimensional distances of length, breadth and thickness, normal to one another, in a ratio of 0.4-1.5:1:0.4-1.5.

7. (Amended) A composition as claimed in claim 2 wherein the seed crystals are rounded calcium carbonate crystals having a diameter in the range of 1 to 2.5 microns.

8. (Amended) A method of reducing deposition of mineral salts from an aqueous supersaturated solution onto a solid surface in contact with the aqueous supersaturated solution which method comprises:

- (a) forming a composition as claimed in claim 1;
- (b) distributing said composition into either (i) an aqueous supersaturated solution of the mineral salt or (ii) an aqueous precursor liquid of the aqueous supersaturated solution which aqueous precursor liquid is saturated with respect to the seeds, and in the case of (b)(ii) converting the aqueous precursor liquid into an aqueous supersaturated solution of the mineral salt; and

(c) contacting the treated aqueous supersaturated solution with the solid surface.

11. (Amended) A method as claimed in claim 9 wherein the frequency of the ultrasonic vibration is between 16 and 40kHz.

13. (Amended) A method as claimed in claim 9 wherein the duration of the applied ultrasonic vibration is 0.05 to 360 seconds.

14. (Amended) A method as claimed in claim 9 wherein the degree of supersaturation of the aqueous supersaturated solution which is subjected to the ultrasonic vibration is 50 to 400 times over the saturation level.

15. (Amended) A method as claimed in claim 9 wherein the supersaturated solution which subjected to the ultrasonic vibration is obtained by passing 2 or more aqueous solutions of the separate components of the mineral salt or of the separate components of the isomorphous salt to a locus of mixing, at which locus the aqueous supersaturated solution is formed and the ultrasonic vibration is applied.

16. (Amended) A method as claimed in claim 8 wherein the percentage weight of seed crystals from the dispersion to the total weight of seed crystals

and depositable mineral salts is in the range 10 to 500/o w/w.

17. (Amended) A method as claimed in claim 8 wherein distribution of the composition into the aqueous supersaturated solution or aqueous precursor liquid is performed 2 to 4 times with the distribution steps being in series or parallel or a combination of both.

18. (Amended) A method as claimed in claim 8 wherein the aqueous precursor liquid is converted into an aqueous supersaturated solution of the mineral salt by (i) cooling and/or reducing the pressure of the aqueous precursor liquid or (ii) by adding a complementary ion to the precursor liquid.

22. (Amended) An apparatus as claimed in claim 19 in which the apparatus has a first line for the aqueous supersaturated solution leading to the mixing chamber and a side line from the first line leading to the crystal seed generator chamber(s).

23. (Amended) An apparatus as claimed in claim 19 in which the apparatus further comprises:

a first line for the first aqueous precursor liquid leading to the mixing chamber and a side line from the first line leading to the crystal seed generator chamber(s),

a second line for the second aqueous precursor liquid leading to the mixing chamber, and a side line from the second line leading to the crystal seed generator chamber(s).

24. (Amended) An apparatus as claimed in claim 19 which additionally comprises a means for monitoring the size of the seed crystals.

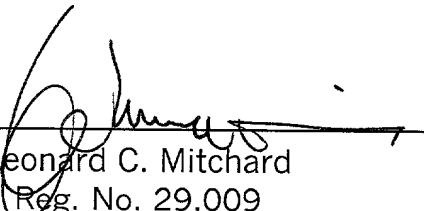
REMARKS

The above amendments have been made to place the application in a more traditional format. Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached pages are captioned

"Version With Markings To Show Changes Made."

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

3. (Amended) A composition as claimed in [Claims 1 or 2] claim 1 wherein the seed crystals are of Mean particle size of 0.5 to 2 microns.

4. (Amended) A composition as claimed in [any one of the preceding claims] claim 1 wherein the seed crystals are present in the dispersion in an amount of from 1 to 60% by weight based on the total weight of dispersion.

5. (Amended) A composition as claimed in [any one of the Claims 2 to 4] claim 2 wherein the seed crystals are barium sulphate crystals and have 3 dimensional distances of length, breadth and thickness, normal to one another, in a ratio of 0.4-1.5:1:0.4-1.5.

7. (Amended) A composition as claimed in [any one of claims 2 to 4] claim 2 wherein the seed crystals are rounded calcium carbonate crystals having a diameter in the range of 1 to 2.5 microns.

8. (Amended) A method of reducing deposition of mineral salts from an aqueous supersaturated solution onto a solid surface in contact with the aqueous supersaturated solution which method comprises:

(a) forming a composition as claimed in [any one of Claims 1 to 7]

claim 1:

- (b) distributing said composition into either (i) an aqueous supersaturated solution of the mineral salt or (ii) an aqueous precursor liquid of the aqueous supersaturated solution which aqueous precursor liquid is saturated with respect to the seeds, and in the case of (b)(ii) converting the aqueous precursor liquid into an aqueous supersaturated solution of the mineral salt; and
- (c) contacting the treated aqueous supersaturated solution with the solid surface.

11. (Amended) A method as claimed in [Claims 9 or 10] claim 9 wherein the frequency of the ultrasonic vibration is between 16 and 40kHz.

13. (Amended) A method as claimed in [any one of Claims 9 to 12] claim 9 wherein the duration of the applied ultrasonic vibration is 0.05 to 360 seconds.

14. (Amended) A method as claimed in [any one of Claims 9 to 13] claim 9 wherein the degree of supersaturation of the aqueous supersaturated solution which is subjected to the ultrasonic vibration is 50 to 400 times over the saturation level.

15. (Amended) A method as claimed in [any one of Claims 9 to 14]

claim 9 wherein the supersaturated solution which subjected to the ultrasonic vibration is obtained by passing 2 or more aqueous solutions of the separate components of the mineral salt or of the separate components of the isomorphous salt to a locus of mixing, at which locus the aqueous supersaturated solution is formed and the ultrasonic vibration is applied.

16. (Amended) A method as claimed in [any one of Claims 8 to 15]

claim 8 wherein the percentage weight of seed crystals from the dispersion to the total weight of seed crystals and depositable mineral salts is in the range 10 to 500/o w/w.

17. (Amended) A method as claimed in [any one of Claims 8 to 16]

claim 8 wherein distribution of the composition into the aqueous supersaturated solution or aqueous precursor liquid is performed 2 to 4 times with the distribution steps being in series or parallel or a combination of both.

18. (Amended) A method as claimed in [any one of Claims 8 to 17]

claim 8 wherein the aqueous precursor liquid is converted into an aqueous supersaturated solution of the mineral salt by (i) cooling and/or reducing the pressure of the aqueous precursor liquid or (ii) by adding a complementary ion to the precursor liquid.

22. (Amended) An apparatus as claimed in [any one of Claims 19 to 21] claim 19 in which the apparatus has a first line for the aqueous supersaturated solution leading to the mixing chamber and a side line from the first line leading to the crystal seed generator chamber(s).

23. (Amended) An apparatus as claimed in [any one of Claims 19 to 21] claim 19 in which the apparatus further comprises:

a first line for the first aqueous precursor liquid leading to the mixing chamber and a side line from the first line leading to the crystal seed generator chamber(s),

a second line for the second aqueous precursor liquid leading to the mixing chamber, and a side line from the second line leading to the crystal seed generator chamber(s).

24. (Amended) An apparatus as claimed in [any one of Claims 19 to 23] claim 19 which additionally comprises a means for monitoring the size of the seed crystals.